GT Horizontal Split Casing Pumps

302-054

Operations and Maintenance Manual

SUPERSEDES: New

EFFECTIVE: March 1, 2009

Plant ID No. 001-3930

SAFETY REQUIREMENTS

These operating instructions must be complied with during installation, operation and maintenance, and must be read by the operator before commencement of any work. Only fully qualified personnel may carry out work on the pump set. Non-compliance with these instructions may lead to damage to the equipment, serious injury or hazard to the environment.

CAUTION: Read these instructions before putting the pump into service.

CAUTION: Installation and operation should be carried out by qualified personnel only.

CAUTION: Danger of electrocution. Electric supply must be isolated before working on the pump set.

CAUTION: Electrical work should only be carried out by qualified personnel.

A: GENERAL

Taco GT pumps are single stage double suction axially split pumps supplied either bare shaft or complete with an electric motor. Details of the pump type and model, serial number and operating data are indicated on the pump nameplate.

The pump must be installed and operated in full compliance with these instructions. The pump may not be operated outside the limits specified on the nameplate and within this manual. The pump should only be operated by skilled trained personnel. The manufacturer will not accept liability if these instructions are not followed. This manual does not take into account any specific local regulations or bylaws that may be applicable, and it is the responsibility of the installer to ensure compliance with such regulations.

A1: Application

Taco GT pumps are suitable for continuous pumping of clean water and liquids with properties similar to water, with fine solids content not exceeding 200 ppm.

A2: Area of Operation

May be installed within a building or externally. Wherever installed, protect the pump from frost, snow and flooding. Care must be taken to ensure that cold weather will not cause the pump or pipes to freeze, and installers may wish to consider lagging or trace heating.

A3: Spare Parts

Spare parts are available from Taco distributors which can be located at www.taco-hvac.com. Please quote the pump model and serial number for all spares enquiries.

The pump user is strongly recommended to carry replacement spares for parts which are wearing items:

- Mechanical seal or gland packing
- Casing wear ring
- Shaft sleeve
- Casing gasket
- Gland plate gasket

Only genuine Taco spare parts should be fitted. Use of other parts will invalidate the manufacturer's warranty and liability for consequential damage.

A4: Transport

The pumpset must remain horizontal during transport and lifting. Only use certified lifting equipment suitably rated for the weights to be lifted.

When hoisting the bareshaft pump only, secure a sling of suitable load capacity around the suction flange and bearing housing as indicated (see Figure 1). For new installations, keep the pump on its original pallet while moving around site or on transport. If the original pallet is not available, the pump should be securely bolted to a pallet of generous size to ensure stability.

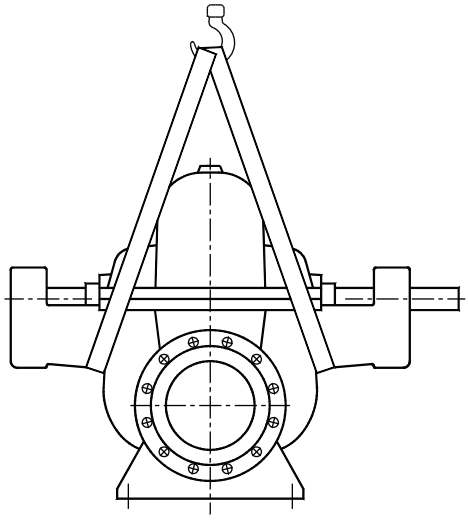


Figure 1: Attaching a Sling to the Pumpset

Lifting the complete pumpset (pump, motor and bedplate) may be carried out using a forklift or with a set of lifting chains secured to the lifting points provided on the bedplate (see Figure 2).

CAUTION: When using a forklift, particular care should be taken to properly balance the load. The electric motor may be significantly heavier or lighter than the pump. If possible, use the original pallet or skid provided.

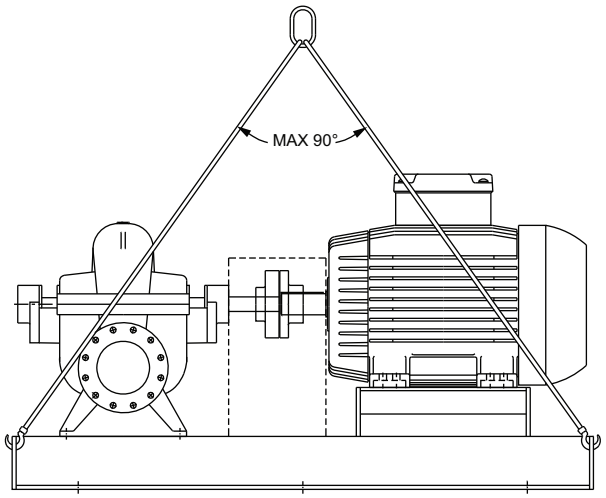


Figure 2: Lifting the Complete Pumpset

A5: Storage

If not to be used immediately, the pumpset should be stored in a dry, warm and vibration-free environment. For extended periods of storage, pump and motor shaft should occasionally be rotated one full turn. Do not remove flange covers until the pump is ready to be connected to its pipework.

A6: Foundation

The foundation should be sufficiently substantial to reduce vibrations and rigid enough to avoid any twisting or misalignment.

(See Figure 3.)

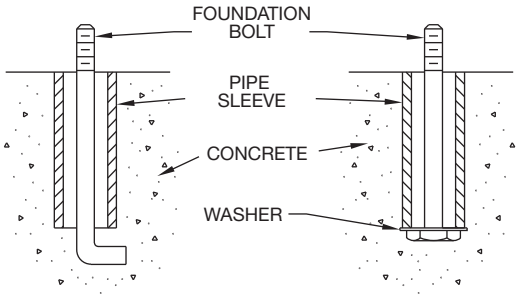


Figure 3

The foundation should be poured without interruptions to within ½ to 1½ inches of the finished height. The top surface of the foundation should be well scored and grooved before the concrete sets. This provides a bonding surface for the grout. Foundation bolts should be set in concrete. Allow enough bolt length for grout, shims, lower baseplate flange, nuts and washers. The foundation should be allowed to cure for several days before the baseplate is shimmed and grouted.

A7: Baseplate Setting

Use blocks and shims under base for support at foundation bolts and midway between bolts to position base approximately 1 inch above the concrete foundation with the studs extending through holes in the baseplate.

(See Figure 4.)

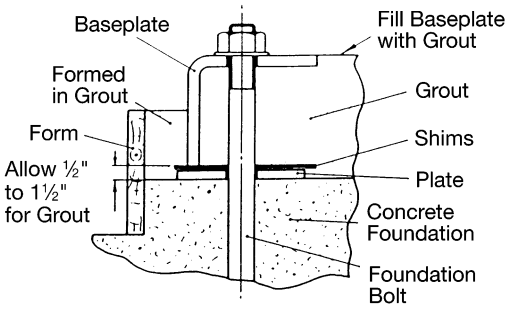


Figure 4

By adding or removing shims under the base, level the pump shaft and flanges. The baseplate does not have to be level.

Draw foundation bolt nuts tight against baseplate and observe pump and motor shafts or coupling hubs for alignment.

Check to make sure the piping can be aligned to the pump flanges without placing pipe strain on either flange.

Grout baseplate in completely and allow grout to dry thoroughly before attaching piping to pump (24 hours is sufficient time with approved grouting procedure).

A8: Grouting Procedure

Grout compensates for uneven foundation, distributes weight of unit and prevents shifting (see Figure 4). After setting and levelling unit, use an approved, non-shrinking grout as follows:

(a) Build strong form around foundation to contain grout.
(b) Soak top of concrete foundation thoroughly, then remove surface water.
(c) Baseplate should be completely filled with grout and, if necessary, drill vent holes to remove trapped air.
(d) After the grout has thoroughly hardened, check the foundation bolts and tighten if necessary.
(e) Check the alignment after the foundation bolts are tightened.
(f) Approximately 14 days after the grout has been poured or when the grout has thoroughly dried, apply an oil base paint to the exposed edges of the grout to prevent air and moisture from coming in contact with the grout.

A9: Coupling Alignment

Although the coupling will have been aligned during manufacture, it is important that the coupling alignment is checked and, if necessary, adjusted after installation. Small deflections of the bedplate during transport and installation can affect the alignment. A misaligned coupling can cause vibration and reduced bearing life for the pump and motor.

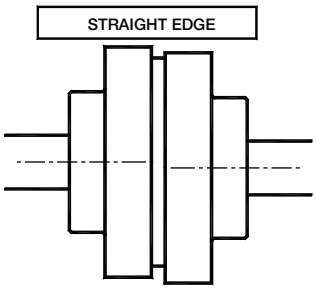


Figure 5a

Use a straight edge and gauge to check the parallel alignment and the angular alignment.

Adjustment is usually made by moving the motor, and adding or subtracting shims from under the motor feet.

(See Figures 5a and 5b.)

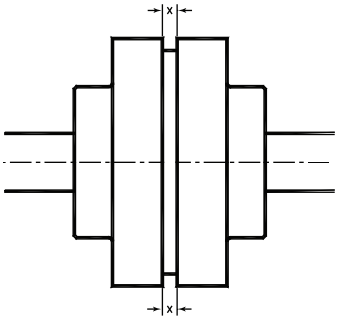


Figure 5b

A10: Pipe Connections

Pipes must be independently supported, and arranged in such a way that expansion or contraction along the length of the pipe does not impose strain on the pump flanges. Never use the pump itself to support the pipes. Locate pipe supports close to the pump.

Never force the pipes into place to align with the pump flanges, as this will impose unacceptable loads on the pump. Where necessary, flexible jointed pipework should be fitted to accommodate small movement of the pipe and eliminate strain on the pump.

It is usual practice to fit pipes of one or two sizes larger than the bore of the pump's suction and discharge. For short pipe runs, it may be economical to fit pipes of the same diameter as the pump flanges. Do not fit pipes of a smaller bore than the pump flange size.

Most systems require the installation of suction and discharge valves, and a non-return valve on the discharge pipeline. We would recommend fitting such valves for ease of maintenance. If the flowrate is to be regulated or initially set with the discharge valve, fit a gate valve in preference to a wafer type discharge valve.

Before final connection of the pump on a new system, thoroughly clean and flush all suction pipes and tanks to eliminate weld debris and scale, which can become dislodged and block the suction of the pump. A temporary strainer can be fitted to the suction line to prevent debris from entering the pump.

A11: Electrical Connection

Where the pump is to be driven by an electric motor, observe the instructions provided by the electric motor manufacturer. Electrical installation should only be carried out by a skilled electrician. The installation should be grounded at the motor, pipes, support frame and pump as appropriate.

A12: Vibration Isolation

Pumps installed in some buildings may require isolation from the floor and pipes using anti-vibration mounts and flexible pipe connectors.

B: OPERATION

CAUTION: Isolate the electrical supply before commencing work on the pump.

When correctly installed and operated, this Taco pump will give many years of trouble-free service. In operation, the pump should be free from vibration and run smoothly. Any changes to smoothness of operation should be investigated immediately. The pump should be visually checked periodically.

B1: Priming the Pump

Pumps operating on flooded suction conditions (where the liquid source is higher than the pump) are easily primed by opening the suction valve, releasing air vent on the pump discharge, and allowing the pump casing to fill with liquid. (See Figure 6.)

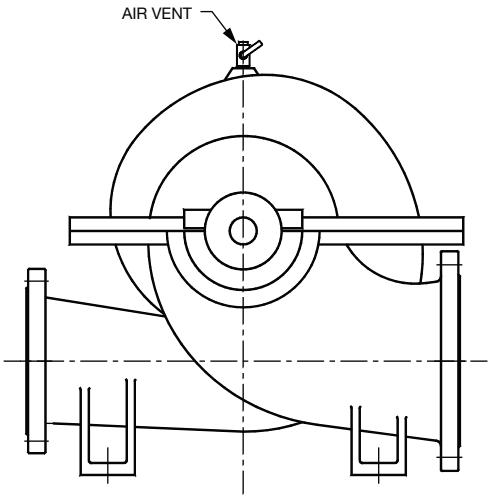


Figure 6: Air Vent Location

For pumps operating on a suction lift, the usual practice is to fit a foot valve to the suction pipe. This foot valve retains liquid within the suction pipe and pump casing when the pump is idle.

B2: Starting the Pump

Before the pump is started for the first time, it is important to check the following points:

- Check that the pump rotates freely by hand.
- Open the suction valve fully and evacuate all the air inside the pump casing to prime the pump.
- Close the discharge fully for the first start after installation or service.
- Momentarily start and stop the electric motor or engine driver to check that the rotation is correct.
- The pump may now be run. On starting, observe the discharge pressure.
- Slowly open the discharge valve. The pressure will gradually fall as the flowrate through the pump increases.
- Open the discharge valve only until the required pressure is indicated on the pressure gauge.

B3: Over-Pumping

When pipework system losses are estimated, an extra allowance in head is often made for pipe deterioration, or the pump is oversized to allow for future expansion. In these circumstances, it is likely that the pump will operate at a higher flowrate than intended, which may result in excessive loads on the pump bearings and driver overload. The operator should limit the flow by adjustment of the discharge valve, referring to the discharge pressure gauge to obtain the design conditions. For pumps driven by electric motor, the operator should verify that the motor nameplate current is not being exceeded.

B4: Minimum Flowrate

Taco GT pumps should not be continually operated at a flowrate below 30% of the peak efficiency flowrate unless otherwise specifically agreed by the manufacturer. If the system is such that zero flow or less than 30% of peak efficiency flow will occur, a return line must be fitted.

B5: Thermal Shock

Taco GT pumps are not designed to withstand rapid changes in temperature. Where a pump is handling hot liquids, the liquid should be introduced slowly allowing the pump to gradually increase in temperature.

B6: Thermal Hazards

Pumps handling hot liquid in excess of 154°F present a hazard to personnel if the hot surface of the pump casing or associated pipework is touched. The installer is responsible for warnings and means of protection.

B7: Materials Compatibility

The materials of construction of this pump have been selected by agreement between the manufacturer and the buyer, to be compatible with the pumped liquid as specified. The installer is responsible for ensuring that the liquid actually handled on site is as specified. Should there be any doubt, the installer is to seek advice before proceeding.

B8: Controlling Solids

Where solids may be present, a strainer may be fitted to the pump suction line to prevent entry into the pump impeller, preventing possible damage to the impeller. A regular schedule should be established to check and clean the strainer. A blocked strainer will cause the pump to cavitate resulting in damage to the impeller.

B9: Dry Running

The pump must never be allowed to run dry. Possible seizure of the internal close clearances, and failure of the mechanical seal may result. The operator should regularly check that the pump suction source is adequate. In some installations, it may be prudent to fit a level device or other means of automatic protection to prevent the pump from dry running.

B10: Automatic Operation

Pumps operating on an automatic control system must not be allowed to run at zero flow or flow below 30% of the peak efficiency flowrate. Interlocks should be fitted appropriate to the system. The pump should not be started more than 10 times per hour, as damage to the shaft coupling and driver may result. Installation of a pressure tank or timers on the electrical control should be considered as required to reduce the frequency of starts.

B11: Protection from Freezing

Where the pumpset may be exposed to cold weather, ensure that the pump and associated pipework is lagged or trace heated to prevent frost damage.

C: MAINTENANCE

C1: Electrical Supply Isolation

For pumps driven by electric motor, always isolate the electrical power supply before working on the pump. Affix a notice on the electrical isolator to inform others that work is being carried out on the installation. If possible lock closed the supply isolator.

C2: Lubrication

The pump bearings are provided with grease fittings. Apply a high quality bearing grease (Shell Alvania or equal) every 2000 hours, or every six months, whichever comes first. Grease containing dust and particles will quickly destroy the bearings. Only use fresh grease from a sealed grease gun.

C3: Mechanical Seal

The mechanical seal is a wearing item. Life of a seal depends on the erosive properties of the pumped liquid, and the temperature and pressure of operation. The seal is self-adjusting, and requires no periodic maintenance.

C4: Strainer

If a strainer is fitted to the suction pipe before the pump, periodically check and clean the strainer element. A blocked or leaking strainer will cause cavitation damage to the impeller.

C5: Free Rotation

The pump should rotate freely by hand. Having isolated the power supply, remove one of the guards and rotate the shaft by hand to check freedom of rotation. Replace all guards prior to operating the pump.

C6: Flooding

If the pump is accidentally subjected to flooding, on no account operate the pump until it is thoroughly dry and checked. If water has entered the pump's bearing housing, it is likely that the bearings will need to be cleaned or replaced. For pumps driven by an electric motor, check that the motor fan is cleared of debris and is free to rotate.

Inspect the pump shaft for debris.

D: DISASSEMBLY

D1: Special Tools

No special tools are required for disassembly of the pump set. In preparation for disassembly, the pump should be allowed to cool to ambient temperature before commencing any work. Close the suction and discharge valves and drain the pump of liquid by releasing the casing drain plug. If the pump is driven by an electric motor, ensure the power supply is isolated.

D2: Removing the Casing Top Half

Access to the pump internals is provided by a removable casing top half. Before proceeding with removal, ensure that gasket material of the correct thickness is available, as the gasket should be replaced.

1) With the coupling guard removed, disconnect the drive coupling between pump and driver.
2) Withdraw the two glands (for packed gland pumps) or mechanical seal glandplates, if fitted, by removal of their retaining nuts. Slide the glands or glandplates along the shaft toward each bearing. (See Figure 7.)
3) Remove all the nuts on the casing split flange.
4) Using the jacking bolts provided, the casing top half may now be separated and raised by 1-2 mm.
5) Using suitable lifting tackle, the top half casing may now be lifted away. The pump internals may now be inspected.

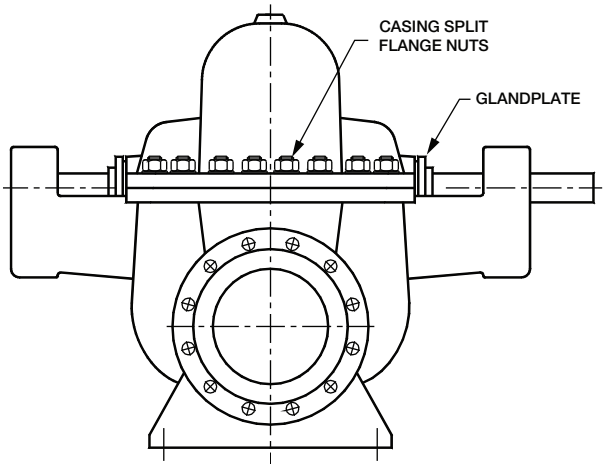


Figure 7

D3: Removing the Rotating Assembly

The complete rotating assembly, comprising the impeller, shaft, shaft sleeves and bearings may be lifted out as a single unit. Release the bearing bracket bolts, and use a soft sling around the exposed parts of the shaft to lift the rotating assembly clear.

(See Figure 8.)

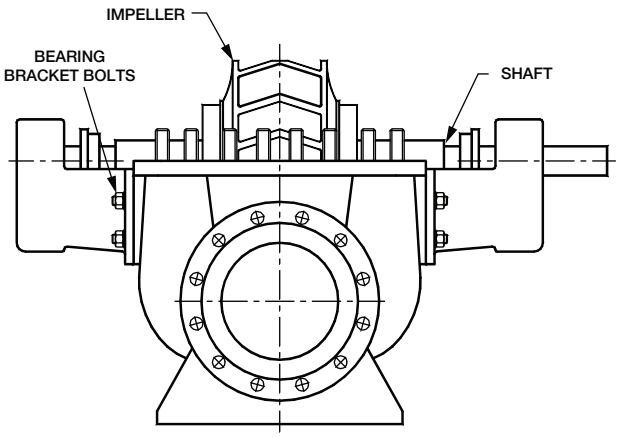


Figure 8

D4: Removing the Impeller

Strip the shaft of its bearings and shaft sleeves to allow the impeller to be withdrawn from the shaft. Note the direction of the impeller vanes, so that the impeller may be re-assembled in the correct rotational direction.

Impeller passages should be free from debris. Check for cavitation damage to the eye of the impeller, where the liquid enters. Cavitation is caused when there is insufficient suction pressure to the pump. Pitting or spongified surfaces to the impeller vanes may be seen.

D5: Removing the Mechanical Seal

The mechanical seal (if fitted) may be removed without lifting the top half casing. The bearing bracket must first be removed, by detaching the bearing covers and releasing the bearing from the shaft. The bearing bracket will now slide off the shaft horizontally, providing access to the mechanical seal glandplate. Withdraw the glandplate nuts and remove, to reveal the mechanical seal.

D6: Mechanical Seal Problems

Mechanical seals will fail if allowed to run dry. This can occur even if the pump is seemingly full of liquid, if a vapor pocket builds up in the seal area.

Pumps operating on hot water duties are particularly prone to this failure, if the static pressure in the system is insufficient to prevent local vaporization. Failure of a seal may also indicate worn bearings, hence it is good practice to inspect and if necessary replace the shaft bearings when a seal is changed.

D7: Fitting a New Casing Wear Ring

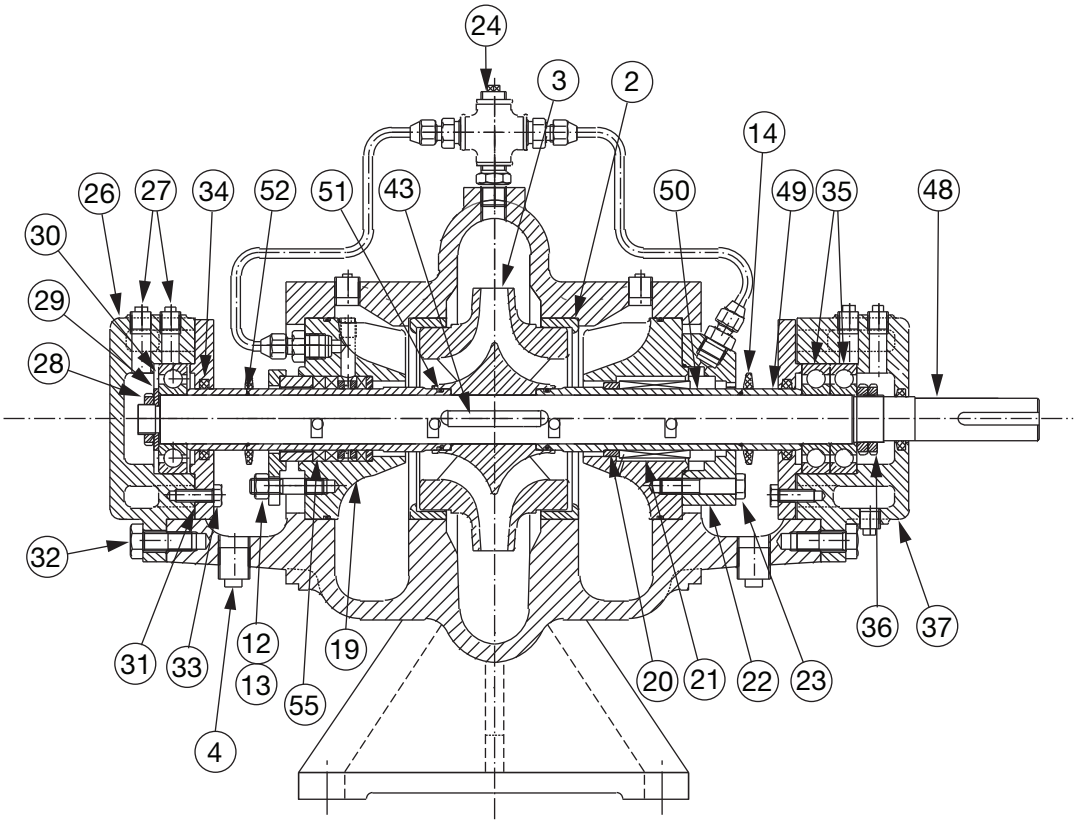
The casing is provided with wear rings which may be replaced after prolonged service, to restore the close clearances with the impeller. The standard clearance for a new pump is 0.4-0.5 mm diametrically, between the bore of the wear ring and the outside diameter of the impeller neck.

The efficiency of the pump will deteriorate as the clearance increases through normal wear. To extract the casing wear ring, it will be necessary to remove the top half casing and rotating element as described earlier. When replacing the wear ring, be sure to thoroughly clean the casing seating, as the wear ring must be positioned concentrically upon reassembly.

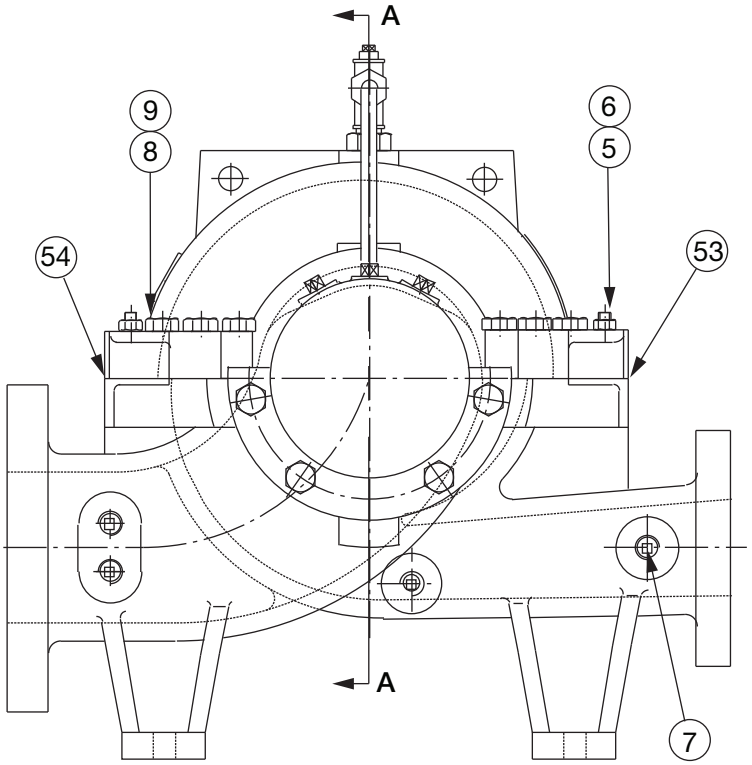
D8: Casing Gasket

Whenever the top half casing is removed, the casing gasket should be replaced. If a gasket is cut on site, ensure that the gasket paper used is of the correct thickness, and that the gasket material is compatible with the liquid being pumped. It is good practice to leave extra gasket material in the glandplate sealing area, to be trimmed off once the top half casing is fully bolted down.

TYPICAL CROSS SECTION MECHANICAL SEAL PUMP



SECTION A–A



FRONT VIEW – PUMP ONLY

REF.	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
2	Wear Ring	23	Seal Retainer Cap Bolt	36	Bearing Retaining Nut (DE)
3	Impeller	26	Bearing Housing (NDE)	37	Bearing Housing (DE)
4	Casing Drain Plug	27	Bearing Housing Plug	43	Impeller Key
5	Casing Stud	28	Bearing Retaining Nut (NDE)	48	Shaft
6	Casing Nut	29	Bearing Retaining Washer (NDE)	49	Outer Shaft Sleeve
7	Pipe Plug	30	Bearing (NDE)	50	Inner Shaft Sleeve
8	Double End Column Bolt	31	Bearing Retaining Cover	51	Inner Shaft Oil Ring
9	Casing Nut	32	Bearing Housing Bolt	52	Outer Shaft Oil Ring
12	Seal Retainer Cap Nut	33	Bearing Retaining Cover Bolt	53	Casing Gasket (Discharge Side)
13	Seal Retainer Cap Stud	34	Bearing Retaining Cover Oil Seal	54	Casing Gasket (Suction Side)
21	Mechanical Seal	35	Bearing (DE)	55	Seal Packing *

* Not Available At This Time

NOTES

NOTES

LIMITED WARRANTY STATEMENT

Taco, Inc. will repair or replace without charge (at the company's option) any commercial pump product or part which is proven defective under normal use within one (1) year from the date of start-up or one (1) year and six (6) months from date of shipment (whichever occurs first).

Motors provided on commercial pumps are not covered by this warranty, and are warranted by the motor manufacturer. For complete details on motor warranty returns, the purchaser should contact the motor manufacturer's local service repair center or contact the motor manufacturer directly.

Seals provided on commercial pumps are not covered by this warranty.

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at [401-942-8000].

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.

TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

Do it Once. Do it Right.®

TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 FAX: (401) 942-2360.
TACO (Canada), Ltd., 8450 Lawson Road, Unit #3, Milton, Ontario L9T 0J8. Telephone: 905/564-9422. FAX: 905/564-9436.

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